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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,890	07/24/2003	Mitsuru Kano	9281-4610	3821

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EXAMINER

SCHECHTER, ANDREW M

ART UNIT	PAPER NUMBER
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2871

DATE MAILED: 03/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No. 6

10/627,890

Applicant(s)

KANO ET AL.

Examiner

Andrew Schechter

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 January 2005.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 10-30 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☒ Claim(s) 14-23 is/are allowed.
6) ☒ Claim(s) 1-8, 10-13, 24-26 and 28-30 is/are rejected.
7) ☒ Claim(s) 27 is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 24 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 14 and 24 are objected to because of the following informalities: the phrase "reflecting layer" is repeated twice in line 9 of each claim. Appropriate correction is required.
2. Claim 24 is objected to because of the following informalities: "an upper or lower surface and edge of an upper layer of the switching elements" should be "an upper or lower surface, and an edge of an upper layer, of the switching elements" to avoid ambiguity (see p. 9 of the applicant's response of 13 January 2005). Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 7 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 7 appears to be directed to embodiments other than that recited by the amended claim 1, with the result that its limitations contradicts those of claim 1. Claim 1

recites that the reflecting layer forming the pixel electrodes, with the switching elements in their vicinity, is on the substrate more distant from a view side than the other substrate. Dependent claim 7 further recites that the switching elements are on the substrate closer to the viewer side, directly contradicting the independent claim. Omitting this limitation would make claims 7 and 8 identical, so there is no point in assuming the limitation was meant to be omitted. Claim 7 is therefore rejected.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-8 and 10-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 has been amended to recite "an alignment layer having ... an opposing planar surface contacting the optical modulation layer". This is shown in Fig. 14, but not discussed anywhere in the specification. Therefore, it is not clear what is required by the term "planar". Such alignment layers (made of polyimide, for instance) are often made by spin-coating [for instance in U.S. Patent No. 5,805,252 to *Shimada et al.*] which would tend to make them fairly flat and planar. Yet *Shimada* [see Fig. 14, etc.] depicts the alignment layer as being slightly bumpy, due to the unevenness of the features it is on top of. Since the specification gives no guidance on how the alignment layer is made or how flat it is compared with other typical alignment layers, the scope of the claim is completely unclear to the examiner. For examining purposes, it is assumed

that spin-coating a polyimide layer would produce a satisfactorily "planar" alignment layer.

Claims 2-8 and 10-13 depend from claim 1.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-3, 5, 6, 10, 11, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Kim et al.*, U.S. Patent No. 6,459,463, in view of *Kuwabara et al.*, U.S. Patent No. 6,600,536, and further in view of *Yoshii et al.*, U.S. 2002/0030774.

Kim discloses [see Fig. 1, for instance] an active matrix display device comprising a pair of substrates [10a, 10b]; an optical modulation layer [28] lying between the substrates; a plurality of pixel electrodes [26] provided on one of the substrates [10a]; switching elements [12, etc.] for driving the respective pixel electrodes, provided in the vicinity of the pixel electrodes; one of a reflective and transfective reflecting layer [26] formed on at least one substrate more distant from a viewer side than the other of the substrates; an alignment layer [30a] having one surface contacting the reflecting layer and an opposing planar surface contacting the optical modulation layer; and the reflecting layer forming the pixel electrodes.

Kim depicts in a figure that the alignment layer has an opposing planar surface, but does not discuss how it is made or teach why it should be planar (the same is true of the applicant's own disclosure). *Kuwabara* teaches, for an analogous device, that the alignment layer should be flattened [col. 14, lines 11-35] so that the liquid crystal is uniform in thickness and has no disturbance in orientation, making it possible to attain a high contrast display with constant threshold voltage. It would have been obvious to one of ordinary skill in the art at the time of the invention to do so, motivated by this teaching of *Kuwabara*.

Kim does not necessarily explicitly disclose that the reflecting layer has asymmetrical reflection properties. *Yoshii* discloses an analogous reflecting layer with asymmetrical properties. It would have been obvious to one of ordinary skill in the art at the time of the invention to use *Yoshii's* asymmetric reflection properties with the reflecting layer in *Kim*, motivated by *Yoshii's* teaching that it provides a reflector having desirable reflectance over a wide angle, with the reflectance being selectively enhanced in desirable directions [paragraph 0015]. Claim 1 is therefore unpatentable.

Yoshii's asymmetric reflection properties [see Figs. 1-5] teach that a cross section of the reflection layer has a corrugated surface whose shape from a light-entering direction to a light-receiving direction has asymmetrical curvatures with respect to a normal to the substrate, so claim 2 is also unpatentable. There is an insulating layer [33 in *Yoshii*, 22 in *Kim*] underlying the reflecting layer, and to get the asymmetrical reflection property, the insulating layer is provided with a corrugated surface, to form the corrugated surface of the insulating layer; *Yoshii* may or may not

disclose that the corrugated surface is made by stamping; this is a product-by-process limitation, so that the claim is only limited to the structure implied by the steps [see MPEP 2113], and the structure is the same with or without the step of stamping; claim 13 is therefore unpatentable as well. As can be seen clearly in Figs. 2 and 9 of *Yoshii*, a curve of a cross section of the reflecting layer comprises two curves having different curvatures from each other, so claim 3 is also unpatentable. *Kim* discloses the switching elements being thin film transistors in an inverted-stagger shape, so claims 5 and 6 are also unpatentable. There is an insulating layer [22] in *Kim* covering the switching elements, with a corrugated surface having asymmetrical curvatures [as taught by *Yoshii*], and the pixel electrodes [26] are formed along the corrugated surface so as to provide a corrugated surface having asymmetrical curvatures in the pixel electrodes, so claim 10 is also unpatentable. There are contact holes with conducting portions connecting the pixel electrodes and the switching elements in *Kim*, so claim 11 is also unpatentable.

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Kim et al.*, U.S. Patent No. 6,459,463, in view of *Kuwabara et al.*, U.S. Patent No. 6,600,536, in view of *Yoshii et al.*, U.S. 2002/0030774 as applied above, and further in view of *Takatsuka*, U.S. Patent No. 6,421,106.

Yoshii does not disclose that a maximum tilt angle of the curvatures is 30°. Instead, *Yoshii* discloses [paragraphs 0021-0022] that the tilt angle is preferably between 4° and 35° in view of the observers' normal viewing angle toward the display surface of the LCD (so the maximum tilt angle is 35° rather than 30°). *Takatsuka*

discloses [col. 3, lines 45-60], for analogous divots in an analogous reflector, that the maximum tilt angle should be 18°, teaching that for larger angles the angle of divergence of reflected light increases excessively and the reflection intensity drops, leading to unsatisfactory brightness. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a maximum tilt angle below 30°, motivated by this teaching of *Takatsuka*. Also, from the discussion of *Takatsuka*, it is clear that the maximum tilt angle is a result-effective variable (affecting the brightness, reflectivity, and divergence of reflected light) whose optimization would be obvious to one of ordinary skill in the art at the time of the invention. Claim 4 is therefore unpatentable.

10. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Kim et al.*, U.S. Patent No. 6,459,463, in view of *Kuwabara et al.*, U.S. Patent No. 6,600,536, in view of *Yoshii et al.*, U.S. 2002/0030774 as applied above, and further in view of *Nakamura et al.*, U.S. Patent No. 6,727,967.

Kim does not disclose a color filter on the substrate more distant from the viewer side. *Nakamura* discloses an analogous display [see Fig. 11, for instance] with a color filter [70] on the substrate more distant from the viewer side. *Nakamura* teaches that when the display is in transfective mode, the color filter [50] is used only once compared to when it is in reflective mode, so the additional color filter [70] increases the color density and improves the quality of the color display [see discussion of Fig. 11]. It would have been obvious to one of ordinary skill in the art at the time of the invention to make *Kim*'s display reflective and transfective, motivated by the ability to be seen in either dark or light environments with appropriate power consumption, and it would have

been obvious to one of ordinary skill in the art at the time of the invention to use *Nakamura's* second color filter (on the substrate distant from the viewer side), motivated by *Nakamura's* teaching above. Claim 8 is therefore unpatentable.

To the extent that claim 7 may have been intended to have the color filter on the viewer side substrate and the switching elements on the pixel substrate, *Nakamura* also teaches a color filter on the viewer side substrate; it would have been obvious to one of ordinary skill in the art at the time of the invention to have such a color filter, motivated by the desire to produce a reflective color display. Claim 7 is therefore unpatentable.

11. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Kim et al.*, U.S. Patent No. 6,459,463, in view of *Kuwabara et al.*, U.S. Patent No. 6,600,536, in view of *Yoshii et al.*, U.S. 2002/0030774 as applied above, and further in view of *Shimada et al.*, U.S. Patent No. 6,424,399.

Kim discloses using TFTs, rather than nonlinear two-terminal elements. *Shimada* discloses an analogous device using either TFTs or MIMs (which are nonlinear two-terminal elements); *Shimada* is evidence that TFTs and MIMs are considered art-recognized equivalents for this purpose [col. 30, lines 31-36]. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use MIMs in place of TFTs in the device of *Kim*, motivated by the art-recognized equivalence of the two. Claim 12 is therefore unpatentable.

12. Claims 24-26, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Kanoh et al.*, U.S. Patent No. 6,208,395 in view of *Yoshii et al.*, U.S. 2002/0030774.

Kanoh discloses [see Fig. 34, for instance] an active matrix display device comprising a pair of substrates with an optical modulation layer lying between them, a plurality of pixel electrodes [10] with switching elements [MIM: 291, 322, etc.] provided in the vicinity of each; one of a reflective and transflective reflecting layer formed on at least one substrate more distant from a viewer side than the other substrate, the reflecting layer forming the pixel electrode and contacting an upper or lower surface of the switching element and an edge of an upper layer of the switching element [see Fig. 34D].

Kanoh does not necessarily disclose that the reflecting layer has asymmetrical reflection properties. *Yoshii* discloses an analogous reflecting layer with asymmetrical properties. It would have been obvious to one of ordinary skill in the art at the time of the invention to use *Yoshii's* asymmetric reflection properties with the reflecting layer in *Kim*, motivated by *Yoshii's* teaching that it provides a reflector having desirable reflectance over a wide angle, with the reflectance being selectively enhanced in desirable directions [paragraph 0015]. Claim 24 is therefore unpatentable.

The switching elements are nonlinear two-terminal elements, specifically MIMs, so claims 25 and 26 are also unpatentable. *Yoshii's* asymmetric reflection properties [see Figs. 1-5] teach that a cross section of the reflection layer has a corrugated surface whose shape from a light-entering direction to a light-receiving direction has asymmetrical curvatures with respect to a normal to the substrate, so claim 28 is also unpatentable. As can be seen clearly in Figs. 2 and 9 of *Yoshii*, a curve of a cross

section of the reflecting layer comprises two curves having different curvatures from each other, so claim 29 is also unpatentable.

13. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Kanoh et al.*, U.S. Patent No. 6,208,395 in view of *Yoshii et al.*, U.S. 2002/0030774 as applied above, and further in view of *Takatsuka*, U.S. Patent No. 6,421,106.

Yoshii does not disclose that a maximum tilt angle of the curvatures is 30°. Instead, *Yoshii* discloses [paragraphs 0021-0022] that the tilt angle is preferably between 4° and 35° in view of the observers' normal viewing angle toward the display surface of the LCD (so the maximum tilt angle is 35° rather than 30°). *Takatsuka* discloses [col. 3, lines 45-60], for analogous divots in an analogous reflector, that the maximum tilt angle should be 18°, teaching that for larger angles the angle of divergence of reflected light increases excessively and the reflection intensity drops, leading to unsatisfactory brightness. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a maximum tilt angle below 30°, motivated by this teaching of *Takatsuka*. Also, from the discussion of *Takatsuka*, it is clear that the maximum tilt angle is a result-effective variable (affecting the brightness, reflectivity, and divergence of reflected light) whose optimization would be obvious to one of ordinary skill in the art at the time of the invention. Claim 30 is therefore unpatentable.

Allowable Subject Matter

14. Claim 27 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

15. Claims 14-23 are allowed.

16. The following is a statement of reasons for the indication of allowable subject matter:

The prior art does not disclose the device of claim 14, in particular the limitation that there is an insulating layer containing both a corrugated surface on which the reflecting layer (pixel electrode) is disposed, and a flat portion on which the switching elements are disposed. For instance, U.S. Patent No. 6,806,927 to *Nimura* discloses [see Fig. 19] an insulating layer [11] with a flat portion on which a switching element is disposed, and another region [to the right] on which a reflecting layer with an uneven surface is disposed; however, the insulating layer has portions removed [10b compared to 10a], rather than having a corrugated surface in this region. U.S. Patent No. 6,172,728 to *Hiraishi* discloses [see Fig. 4] an insulating layer [7] with a corrugated portion on which a reflecting layer [4] is disposed, but not a flat portion on which a switching element is disposed [part of the switching element, the gate electrode [12] is below the insulating layer]. Similarly, U.S. Patent No. 6,753,938 to *Yamada et al.* discloses [see Fig. 1] an insulating layer [6] with a corrugated portion on which a reflecting layer is disposed, but not a flat portion on which a switching element is

disposed [since part of the switching element, the gate electrode [3], is below the insulating layer]. Claim 14 is therefore allowed, as are dependent claims 15-23.

Note, however, the objection to claim 14 above.

Similarly, the prior art does not disclose the device of claim 27, in particular the limitation that there is an insulating layer containing both a corrugated surface on which the reflecting layer is disposed, and a flat portion on which the switching elements are disposed. For instance, *Kanoh* [see Fig. 32] discloses the switching element on a flat portion of a surface and the reflecting electrode on a corrugated portion of the same surface, but the surface is the substrate itself, rather than a separate insulating layer. Claim 27 would therefore be allowable if rewritten appropriately.

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

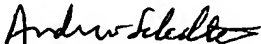
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Andrew Schechter
Patent Examiner
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27 March 2005